

FORM PTO-1390
(REV 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

43376

U.S. APPLICATION NO (If known, see 37 CFR 1.5)

10/070310

INTERNATIONAL APPLICATION NO.
PCT/EP00/08034INTERNATIONAL FILING DATE
August 17, 2000PRIORITY DATE CLAIMED
September 10, 1999

TITLE OF INVENTION STRUCTURED SURFACE, PRODUCTION AND USE OF SAME

APPLICANT(S) FOR DO/EO/US
Axel Schulte and Jan Tuma

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ Other items or information:

| | |
|--|-----------------------------------|
| U.S. APPLICATION NO. 10/070310 INTERNATIONAL APPLICATION NO. PCT/EP00/08034 | ATTORNEY'S DOCKET NUMBER 43376 |
|--|-----------------------------------|

17. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **\$1,040.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **\$890.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **\$740.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **\$710.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **\$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =

CALCULATIONS PTO USE ONLY

\$ 890.00

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

\$

| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | | |
|--------------------|--------------|--------------|-----------|----|--|
| Total claims | 7 - 20 = | 0 | X \$18.00 | \$ | |
| Independent claims | 1 - 3 = | 0 | X \$84.00 | \$ | |

MULTIPLE DEPENDENT CLAIM(S) (if applicable)

+ \$280.00

\$

TOTAL OF ABOVE CALCULATIONS =

\$

Reduction of 1/2 for filing by small entity, if applicable.

\$

SUBTOTAL =

\$ 890.00

Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).

\$

TOTAL NATIONAL FEE =

\$ 890.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **\$40.00** per property

\$ 40.00

TOTAL FEES ENCLOSED =

\$ 930.00

Amount to be refunded:

\$

charged:

\$

a. ☒ A check in the amount of \$ 930.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 18-2220. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

Roylance, Abrams, Berdo & Goodman, L.L.P.

1300 19th Street, N.W., Suite 600

Washington, D.C. 20036

(202) 659-9076

Mark S. Bicks
SIGNATURE

Mark S. Bicks

NAME

28.770

REGISTRATION NUMBER

The PTO did not receive the following listed item(s) _____

NO Assignment Document

43376

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Axel Schulte et al.

Serial No.:

Filed: Herewith

For: STRUCTURED SURFACE,
PRODUCTION AND USE OF SAME:
:
:
:
:
:
:
:
:

Group Art Unit:

Examiner:

PRELIMINARY AMENDMENTCommissioner for Patents
Washington, D.C. 20231

Sir:

Preliminary to examination and calculation of the filing fee, please amend the
above-identified application as follows:

In the Claims

Amend claims 3, 5, 6 and 7 as follows:

3. (Amended) Surface produced according to the method as in Claim 1,
characterized in that the hydrophilic synthetic material of the base structure (10) is polyvinyl
chloride, polyterephthalate, polymethyl methacrylate or polyamide.

00330066006

5. (Amended) Surface as in Claim 3, characterized in that the projection (12) of the first type rising convexly from the base structure has a surface on the base structure (10) of between 20 and 300 micrometers² and the height between base structure (10) and the peak height of the relevant projection (12) of the first type is between 10 and 50 micrometers.

6. (Amended) Surface as in Claim 3, characterized in that limitable areas (14) formed of the projections (12) of the first type construct a cluster structure.

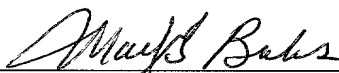
7. (Amended) Use of the surface as in Claim 3 for articles in order to prevent their contamination, while the projections (16) of the second type stand in close proximity with one another, that the free spaces between these projections (16) are smaller than the average diameter of the contamination particle impinging on the surface.

REMARKS

The above changes eliminate multiple dependency in the claims.

Respectfully submitted,

Dated: Mar 4, 2002



Mark S. Bicks
Reg. No. 28,770

Roylance, Abrams, Berdo & Goodman, L.L.P.
1300 19th Street, N.W., Suite 600
Washington, D.C. 20036
(202) 659-9076

Patent Claims

1. Method for the production of a surface for an article having a synthetic base structure (10) with a first type of projections (12) and a second type of projections (16), whereby the projections of similar type are arranged adjacent to one another, whereby the adjacent projections of the first type (12) contact one another with no spacing, whereby the projections of the first and second types (12, 16) are arranged on a common side turned away from the article and whereby the projections of the second type (16) are arranged on the projections of the first type (12), characterized in that the surface is produced continuously by means of a structure and shaping roll (20) as foil or strip material, which is provided with recesses (22, 24) corresponding to the first and second types of projections (12, 16), into which the synthetically producible base structure (10) penetrates for its shaping and that the base structure (10) is formed of a hydrophilic plastic material.
2. Device for execution of the method as in Claim 1, characterized in that the recesses (22, 24) for the structure and shaping roll (20) are

MODIFIED PAGE

-14a-

obtained by a sandblasting method, in which the recesses (24; 22) are formed with a blasting material of larger diameter and a blasting material of smaller diameter for the first type and second type of projections (12; 16), or in which the blasting material is provided on its granular surface with further projections, which form the recesses (22) for the projections (12).

3. Surface produced according to the method as in Claim 1 ~~as well as with a device as in Claim 2~~, characterized in that the hydrophilic

MODIFIED PAGE

synthetic material of the base structure (10) is polyvinyl chloride, polyterephthalate, polymethyl methacrylate or polyamide.

4. Surface as in Claim 3, characterized in that projections of the second type (16) protrude gudgeon-like from the first type (12), that the relevant projection (16) of the second type is of a height shorter than 5 micrometers, preferably between 1.5 and 3 micrometers, and that the spacing between the projections (16) of the second type is likewise smaller than 5 micrometers, and preferably 1 to 3 micrometers.
5. Surface as in Claim 3 ~~or 4~~, characterized in that the projection (12) of the first type rising convexly from the base structure has a surface on the base structure (10) of between 20 and 300 micrometers² and the height between base structure (10) and the peak height of the relevant projection (12) of the first type is between 10 and 50 micrometers.
6. Surface as in ~~one of the Claims 3 to 5~~, characterized in that limitable areas (14) formed of the projections (12) of the first type construct a cluster structure.

7. Use of the surface as in ~~one of the Claims 3 to 6~~ for articles in order to prevent their contamination, while the projections (16) of the second type stand in close proximity with one another, that the free spaces between these projections (16) are smaller than the average diameter of the contamination particle impinging on the surface.

MODIFIED PAGE

Method for the Production of Surfaces
Including Device for Execution of the Method
And the Surfaces and also Their Use

The invention relates to a method for the production of a surface for an object according to the features disclosed in the disclosure part of Patent Claim 1. Furthermore the invention relates to a device for execution of the method as well as to the surface itself and its use.

From De 35 24 653 C2, providing the surfaces in the form of embossed, biaxially laid out foils which form an apertured grid-like cloth as an article with openings and webs is already known, whereby elevated areas are rounded off and deformed each as a sort of projection, which leads to a web component part incorporated within the cloth structure. The manufacture of apertured netted cloths by embossment of a foil of thermoplastic polymers using such a known solution leads to improved properties regarding its grip and with corresponding subsequent treatment leads to reduction of undesirable shiny effects of the material.

MODIFIED PAGE

Furthermore, from EP 0 772 514 B1 are known self-cleaning surfaces of articles which have a synthetic surface structure consisting of projections and recesses of a sort whereby the spacing between the projections is in the range of 5 to 200 micrometers and the height of the projections is in the range of 5 to 100 micrometers. Then in addition at least the projecting parts are to consist of hydrophobic polymers or else materials which are made permanently hydrophobic, and the projections can be loosened and peeled off neither by water nor by water with detergents added thereto.

The known solution shows a surface with these projections for the repelling of contaminants, whereby a simulated lotus-petal structure is synthetically constructed, from which it is known that it is not contaminated because of the capacity of the structure for self-cleaning, and even commercial adhesives are removable from the biological structure. Despite remarkable results with regard to a self-cleaning effect, such known surfaces can be used only in a limited manner, since either the range of materials which can be used in the production is greatly limited or the surface must be treated by

MODIFIED PAGE

further processing for the purpose of making it hydrophobic, which is costly.

Also the known surface can be produced only at high cost while incurring considerable complications. For production of the known surface, coating

www.ijerph.com

methods or shaping methods are provided using high-grade mesh screens, which are costly and difficult to produce. Also in practice it has been shown that such synthetically produced surfaces with 'lotus effect' often do not produce the desired results.

Finally, from PCT/WO 93/01047 is known a surface consisting of a deeply embossed, thermoplastic film. This film surface includes a plurality of macroscopic cells as first projections, which are connected by the areas extending between these adjacent macroscopic cells, whereby the macroscopic cells have a depth of 0.635 to 3.8 mm and in addition to the thermoplastic film incorporate a plurality of microscopic indentations, which construct a fortuitously distributed sandblast pattern on the film, with a spacing between 1.25 and 7.35 micrometers. These microscopic indentations form a second type of projection, which projections have an opposite orientation to the projections of the first type, so that the projections are arranged according to types separated from one another on opposite sides of the surface. Such known surfaces, usually in the form of polyolefin

MODIFIED PAGE

MODIFIED PAGE

sense-perceptions, in other words for use in the field of linings of clothing or else hygienic or sanitary areas, and have no dirt-repelling properties, so that a self-cleaning effect is not demonstrable in this case.

From EP 0 933 388 A2 is known a structured surface with hydrophobic and/or oil-resistant properties with low surface charges. The known surfaces have high boundary or rim angles with water and are cleaned with water only with difficulty and therefore include a self-cleaning effect. In order to attain this a synthetically producible base structure is provided with two different types of projections, whereby a type of smaller projections are mounted on a superstructure, in the form of projections of large dimensions, which are mounted and are in direct contact adjacent to one another. For the production of the known projections and the superstructure as an another type of projections these projections either simultaneously or in sequence are mechanically impressed or embossed into the surface material, etched in by lithographic method or obtained by shaping processing by means of applied or casting technology. With the mechanical imprinting or embossing

MODIFIED PAGE

method it is worked from the reverse side forward on the surface, which then on its opposite side shapes out the aforementioned two types of projections. With etching of the structure into the surface material the damage resulting from the etching medium is to be calculated at least in part. With the surface shaping method first of all the relevant projection structure is applied on the surface by means of an application roll applied to the surface material. The last method is expensive and cost-intensive and does not guarantee that, dependent upon the stress, the structure mounted thereon in this manner not again become detached from the base material. The known casting, imprinting or embossing, etching and surface application methods are therefore not suitable in large-scale measure to make available the production of large quantities of structured surfaces.

Starting from this state of the art the object of the invention is to further improve the known method for the production of synthetic surfaces having two different types of projections, so that they can be realized at lower cost, and reasonably large volumes of surfaces can be made available by use of

MODIFIED PAGE

finishing techniques, and still the surface particularly inheres a very good repelling capacity for contaminants. Such an object discloses a method for the production of such surfaces having the features disclosed in Claim 1 as well as a device for execution of the method with the features disclosed in Claim 2. Another object of the invention is the surface produced according to the method and the device, as well as its use.

Due to the fact that according to the characterizing part of Claim 1 the surface is produced continuously by means of a structure and shaping roll as foil or strip material, which is provided with recesses corresponding to the first and second types of projections, into which the synthetically producible base structure enters for its shaping, a shaping method is realized in which the projections of the first and second type are depicted in reverse in the recesses of the structure roll and the surface is obtained in that manner.

With the resulting method, shaping out by means of a structure and shaping roll having recesses to shape out the convex projections, the dirt-repelling surface can be made available uniformly and cost effectively in large quantities by use of manufacturing technology.

MODIFIED PAGE

-4c-

Preferably the structure and shaping roll is configured so that, particularly with use of a backing roll, a shaping gap is formed, through which the synthetic material passes. Dependent upon the width and the diameter of the structure and shaping roll, the desired surfaces can be produced in any desired length and width and insofar as the backing roll is configured as a shaping roll with a structure comparable to that of the structure and shaping roll, the desired microscopic surface structure can be produced on both sides. The synthetically producible base structure then penetrates into the surface of the structure and shaping roll for its shaping and then immediately leaves the structure and shaping roll as finished product. By the use of hydrophilic plastic material for the base structure therefore an improved dirt-repelling degree can be attained than with the known hydrophilic and/or oil-resistant structures.

In the case of the device according to the invention for execution of the method as in Claim 1, the recesses for the structure and shaping roll are obtained by a sandblast method, in which using a stream of material of

MODIFIED PAGE

larger diameter and another stream of smaller diameter the recesses for the first type and the second type of projections are formed, or in which the stream of material is provided on its granular surface with further projections which form the recesses for the projections of the first type. The resulting sandblast methods are very cost effective and offer the required precision for the subsequent projection structures of the structured surface. The synthetic base structure which is obtained finds its equivalents in nature, for

example in the leaves of the nasturtium. Earlier research has shown that the nasturtium has an extremely fine ultrastructure regarding its leaves, with structural elements in the form of projections which are shorter than 12 micrometers. Such surface structures, which were not known in detail (cf. EP 0 772 514 B1, column 1, lines 4ff), were assumed to not be synthetically producible and considered in relation to their mechanical resistance capacity as extremely sensitive and consequently as unsuitable in terms of practical importance. On the other hand it was seen in technical terms as simple to understand the lotus leaf structure as the natural pattern. It is consequently surprising for the expert in the art that on the one hand the extremely fine ultrastructure of the biological prototype of the nasturtium has succeeded as ascertainable and on the other hand to complete the synthetic construction thereof and to develop said construction further into a product which on the one hand has a very good dirt-repelling property and on the other hand unexpectedly also brings with it the mechanical stability required for such a product.

The basic structure of the surface is indicated by a smooth lotus leaf

MODIFIED PAGE

-5a-

structure, on which the projections are arranged protruding outward in such a manner that the basic structure is not flat, but rather convex projections

2025 RELEASE UNDER E.O. 14176

MODIFIED PAGE

have been constructed thereon, on which in turn the smaller projections are mounted as integral component parts. Such structured surfaces are also indicated in terms of the foils known from PCT/WO 93/01047 and DE 35 24 653 C2. Due to the fact that the first type of projections stands away each as a convex curve from the base structure of the surface, then, as opposed to a smooth structure, a considerably enlarged surface of the mounting of the second type of projections is made available. Despite the doubts inherent in technology, such surfaces according to the invention can be constructed in good form at low cost in large quantities of surface, whereby the thus produced surface is mechanically stable, even under corresponding high stresses applied to the surface or the base structure. Due to the fact that the projections of the first type are arranged in contact with one another in the case of the surface of the invention in such a manner that the adjacent projections of the first type engage on one another in close contact, and they also are cut down clearly smaller than the known orders of magnitude of the dimensions in the case of the lotus leaf solution found in EP 0772 514 B1, if the occasion arises then also an improved repelling behavior to repel

MODIFIED PAGE

polluting particles is provided, since these features can be incorporated between the projections on the basic structure without further steps.

Preferably polyvinyl chloride, polyterephthalate, polymethyl methacrylate or polyamide are used as hydrophilic synthetic materials for the base structure.

Due to the fact that with one preferred embodiment of the surface according to the invention the second type of projections stands out gudgeon-like from the first type of projections and that the relevant projection of the second type is in terms of height shorter than 5 micrometers or between 1.5 and micrometers, and that the spacing between the projections of the second type is likewise smaller than 5 micrometers, preferably 1 to 3 micrometers, a surface of microscopic structure can be disclosed which if required is suitable for use with adhesive closings wherein hook elements of two closing parts cooperate with one another or hook elements of a closing part cooperate with loop material of another part.

MODIFIED PAGE

the surface cannot come in contact with the surface between the projections. Furthermore, the surface can be subjected to a current, for example an air or water current, so that in the main direction of the current, turbulence occurs because of the projections, whereby surprisingly there occurs a lowering of the wall friction. Such surfaces having rib structures can be used for this purpose in the state of the art (cf. for example EP 0 846 617 A2).

Hereinafter the surface is to be described in greater detail relative to one embodiment as shown in the drawing, which also shows more detail for its production and its use.

Shown in the drawing in principle but not in actual dimensions are the following :

- Fig. 1 : a cross section of the surface in a side view;
- Fig. 2 : a planar view of the surface arrangement as in Fig. 1;
- Fig. 3 : a perspective view of the structure and shaping roll for production of the surface as in Figs. 1 and 2 with an enlarged section relating to its recessed structure.

The surface shown in Figs. 1 and 2 for an object which is not to be described in greater detail incorporates a synthetically produced base structure 10, wherein at some spacing therefrom a second type of projections 16 protrudes from the first type of projections adjacent and engaging with one another in close contact, whereby the second type of projections 16 are limited from the first type of projections 12 by areas 14, Fig. 2. The resulting first type of projections 12 is configured to be convexly elevated as compared with the basic structure 10, and, as shown in Fig. 1, forms closed off mounds in and of itself. From observation of Figs. 1 and 2 it is to be noted that it has to do in the case of the cited projections with microscopic structures and accordingly the representation greatly enlarges the effective conditions being represented and also greatly simplifies the picture. Particularly the spaces between the projections are shown only in principle, in order to clarify the sense of the invention. As Figs. 1 and 2 further show, projections 16 of the second type are arranged on the first type of projections 12 and consequently, on the side turned away from the article, form integral component parts of projections 12, with which they are integrally connected.

Basic structure 10 is formed of a synthetic material, preferably of a hydrophilic plastic material, such as polyvinyl chloride, polyterephthalate,

polymethyl methacrylate or polyamide. As Figs.1 and 2 further show, the second type of projections stand projecting gudgeon-like beyond the first type of projections 12, whereby the relevant projection 16 of the second type is of a height shorter than 5 micrometers, preferably between 1.5 and 3 micrometers, whereby the spacing between projections 16 of the second type likewise is smaller than 5 micrometers, preferably 1 to 3 micrometers. The respective height is measured from foot to apex point of each projection 16 and the spacing of projections 16 from one another is the average spacing between the exterior peripheries of projections 16. As can be seen particularly from Fig. 2, the relevant convexly configured projection 12 of the first type has a surface on the base structure 10 of between 20 and 300 micrometers² and the height between base structure 10 and the apex of the relevant projection 12 of the first type is between 10 and 50 micrometers. The limitable areas 14 form a sort of cluster structure and said areas 14 are in contact with one another essentially directly along connection lines 18.

A production method using a shaping or structure roll 20 is used for the production of the aforementioned surface, as is shown in Fig. 3 in its principle construction. Using grooved roll 20 it is possible to continuously produce the surface out of synthetic material as foil or strip material,

whereby said shaping or structure roll 20 is provided with recesses 22 and 24 corresponding to the first and second types of projections 12, 16, into which the synthetically producible basic structure 10 penetrates in order to be shaped. In the direction of viewing seen in Fig. 3, at the top left is shown an enlarged section of the surface of shaping or structure roll 20, which shows the corresponding recesses 22, 24. Preferably a sandblast method is used to produce the resulting recess structure for shaping or structure roll 20, whereby with these sandblasting granules of enlarged diameter greater concave recesses 24 are formed, which thereafter serve for the production of the first type of projections 12 and with a blast material of smaller diameter then within recesses 24 the other recesses 22 can be shaped, which thereafter serve for the production of the second projections 16. Instead of blasting material with various dimensions it is also possible to use also only blasting material which on its granular surface is provided with further projecting components, which form the recesses 22 for projections 16 of the second type. The resulting sandblasting methods are very cost effective and offer the required precision for the subsequent projection structures for the surface of the invention.

Shaping or structure roll 20 can be configured as a hollow cylinder and particularly can be heated, insofar as the plastic material to be treated makes this necessary. When another not shown support roll is incorporated, shaping or structure roll 20 then forms a profiling gap through which the plastic material passes. Dependent upon the width and diameter of shaping or structure roll 20 the desired surfaces can be produced in desired lengths and widths.

The surface thus produced can be used particularly in order to prevent the contamination of the covered articles, and projections 16 of the second type are arranged standing closely adjacent to one another, so that the free spaces between these projections 16 are smaller than the average dimensions of the contamination particles impinging on the surface.

The materials provided for the production of the surface for an article can be formed of regrowth-capable raw materials and are preferably biodegradable. The final regulation in this case is the DIN V 54900 and polyactides have been shown to be particularly suitable for the surface material.

Patent Claims

1. Method for the production of a surface for an article having a synthetic base structure (10) with a first type of projections (12) and a second type of projections (16), whereby the projections of similar type are arranged adjacent to one another, whereby the adjacent projections of the first type (12) contact one another with no spacing, whereby the projections of the first and second types (12, 16) are arranged on a common side turned away from the article and whereby the projections of the second type (16) are arranged on the projections of the first type (12), characterized in that the surface is produced continuously by means of a structure and shaping roll (20) as foil or strip material, which is provided with recesses (22, 24) corresponding to the first and second types of projections (12, 16), into which the synthetically producible base structure (10) penetrates for its shaping and that the base structure (10) is formed of a hydrophilic plastic material.
2. Device for execution of the method as in Claim 1, characterized in that the recesses (22, 24) for the structure and shaping roll (20) are

MODIFIED PAGE

-14a-

obtained by a sandblasting method, in which the recesses (24; 22) are formed with a blasting material of larger diameter and a blasting material of smaller diameter for the first type and second type of projections (12; 16), or in which the blasting material is provided on its granular surface with further projections, which form the recesses (22) for the projections (12).

3. Surface produced according to the method as in Claim 1 as well as with a device as in Claim 2, characterized in that the hydrophilic

MODIFIED PAGE

synthetic material of the base structure (10) is polyvinyl chloride, polyterephthalate, polymethyl methacrylate or polyamide.

4. Surface as in Claim 3, characterized in that projections of the second type (16) protrude gudgeon-like from the first type (12), that the relevant projection (16) of the second type is of a height shorter than 5 micrometers, preferably between 1.5 and 3 micrometers, and that the spacing between the projections (16) of the second type is likewise smaller than 5 micrometers, and preferably 1 to 3 micrometers.
5. Surface as in Claim 3 or 4, characterized in that the projection (12) of the first type rising convexly from the base structure has a surface on the base structure (10) of between 20 and 300 micrometers² and the height between base structure (10) and the peak height of the relevant projection (12) of the first type is between 10 and 50 micrometers.
6. Surface as in one of the Claims 3 to 5, characterized in that limitable areas (14) formed of the projections (12) of the first type construct a cluster structure.

MODIFIED PAGE

7. Use of the surface as in one of the Claims 3 to 6 for articles in order to prevent their contamination, while the projections (16) of the second type stand in close proximity with one another, that the free spaces between these projections (16) are smaller than the average diameter of the contamination particle impinging on the surface.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro



(43) Internationales Veröffentlichungsdatum
22. März 2001 (22.03.2001)

PCT

(10) Internationale Veröffentlichungsnummer
WO 01/19597 A1

(51) Internationale Patentklassifikation⁷: **B29C 59/02**

[DE/DE]; Karlstr. 12, 71088 Holzgerlingen (DE). TUMA,
Jan [DE/DE]; Marchwitza Str. 48, 12681 Berlin (DE).

(21) Internationales Aktenzeichen: PCT/EP00/08034

(22) Internationales Anmeldedatum:
17. August 2000 (17.08.2000)

(74) Anwalt: BARTELS UND PARTNER; Lange Str. 51,
70174 Stuttgart (DE).

(25) Einreichungssprache: Deutsch

(81) Bestimmungsstaaten (*national*): JP, US.

(26) Veröffentlichungssprache: Deutsch

(84) Bestimmungsstaaten (*regional*): europäisches Patent (AT,
BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).

(30) Angaben zur Priorität:
199 43 299.6 10. September 1999 (10.09.1999) DE

(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme
von US): GOTTlieb BINDER GMBH & CO. [DE/DE];
Bahnhofstr. 19, 71088 Holzgerlingen (DE).

Veröffentlicht:
— Mit internationalem Recherchenbericht.

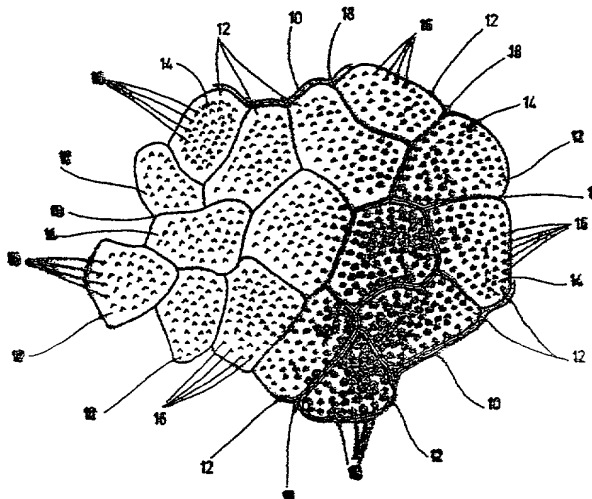
Zur Erklärung der Zweibuchstaben-Codes, und der anderen
Abkürzungen wird auf die Erklärungen ("Guidance Notes on
Codes and Abbreviations") am Anfang jeder regulären Ausgabe
der PCT-Gazette verwiesen.

(72) Erfinder; und

(75) Erfinder/Anmelder (nur für US): SCHULTE, Axel

(54) Title: STRUCTURED SURFACE, PRODUCTION AND USE OF THE SAME

(54) Bezeichnung: STRUKTURIERTE OBERFLÄCHE, IHRE HERSTELLUNG UND VERWENDUNG



(57) Abstract: The invention relates to a surface for an object, comprising a base structure (10) which can be synthetically produced, a first type of projection (12) and a second type of projection (16), whereby projections of each respective type lie adjacent to one another. The invention aims to provide a self-cleaning surface which is cost-effective to produce and has excellent dirt-resistant properties. To this end, the adjacent projections of the first type (12) are in close contact with one another, the projections of the first and second type (12, 16) are located on a common side, facing away from the object and the projections of the second type (16) are arranged on the projections of the first type. The invention also relates to a method for producing said surface and to the use thereof.

[Fortsetzung auf der nächsten Seite]

WO 01/19597 A1

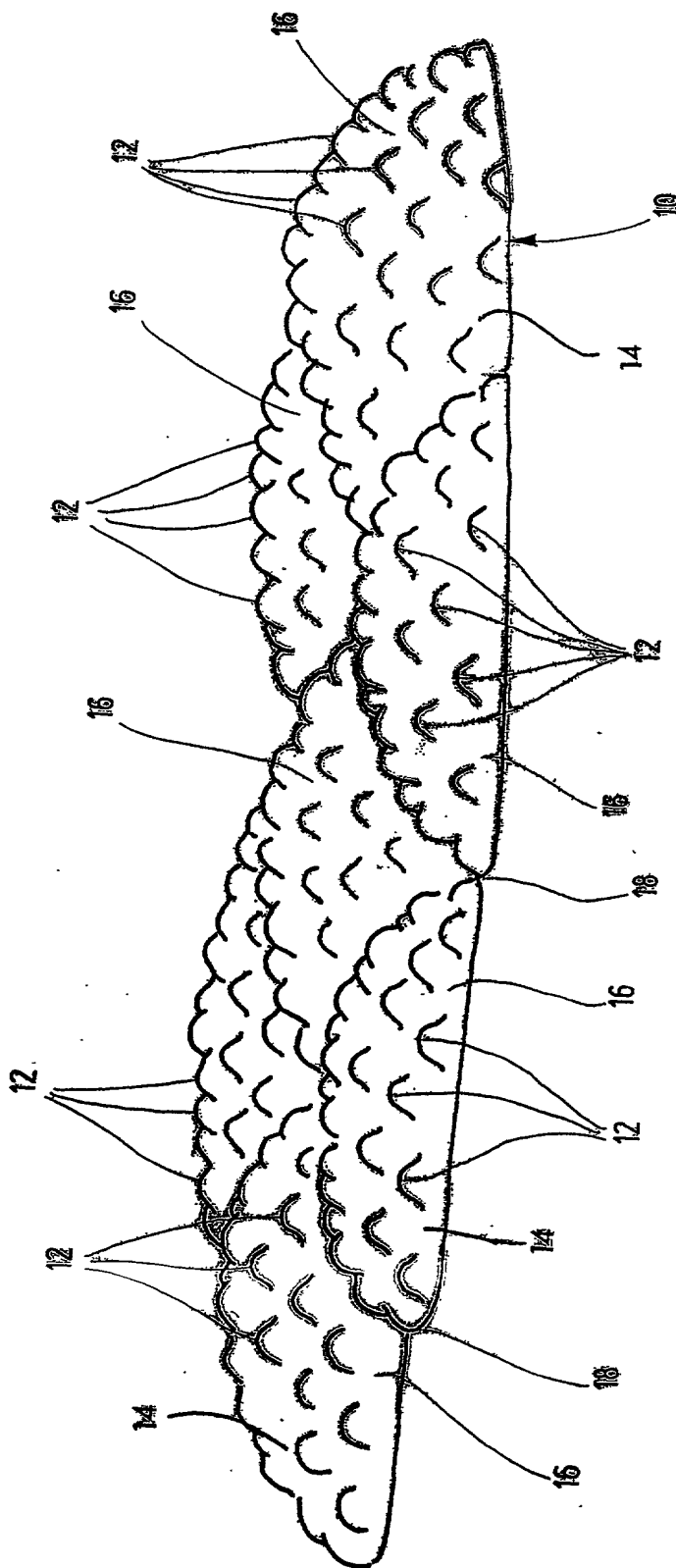
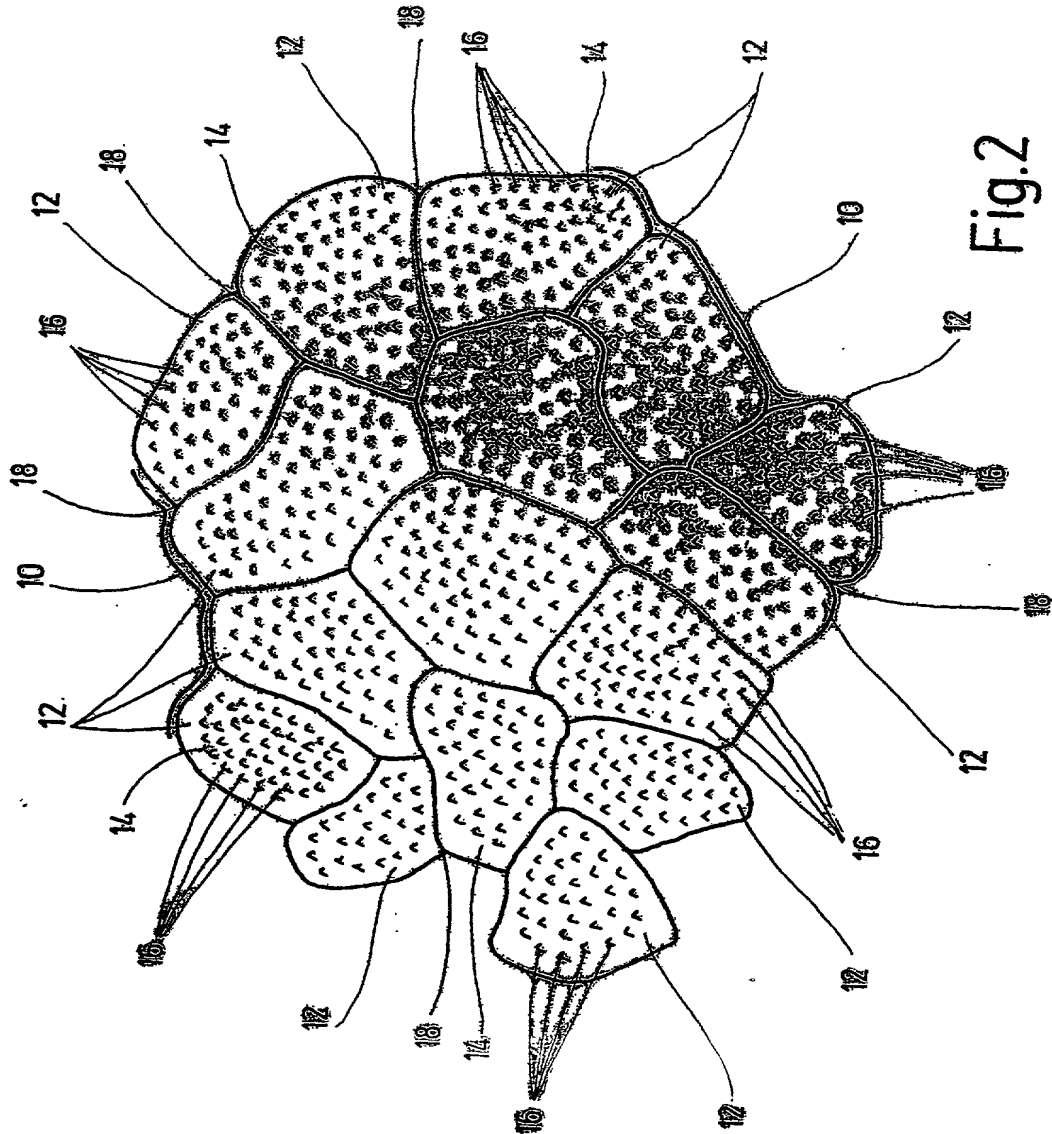
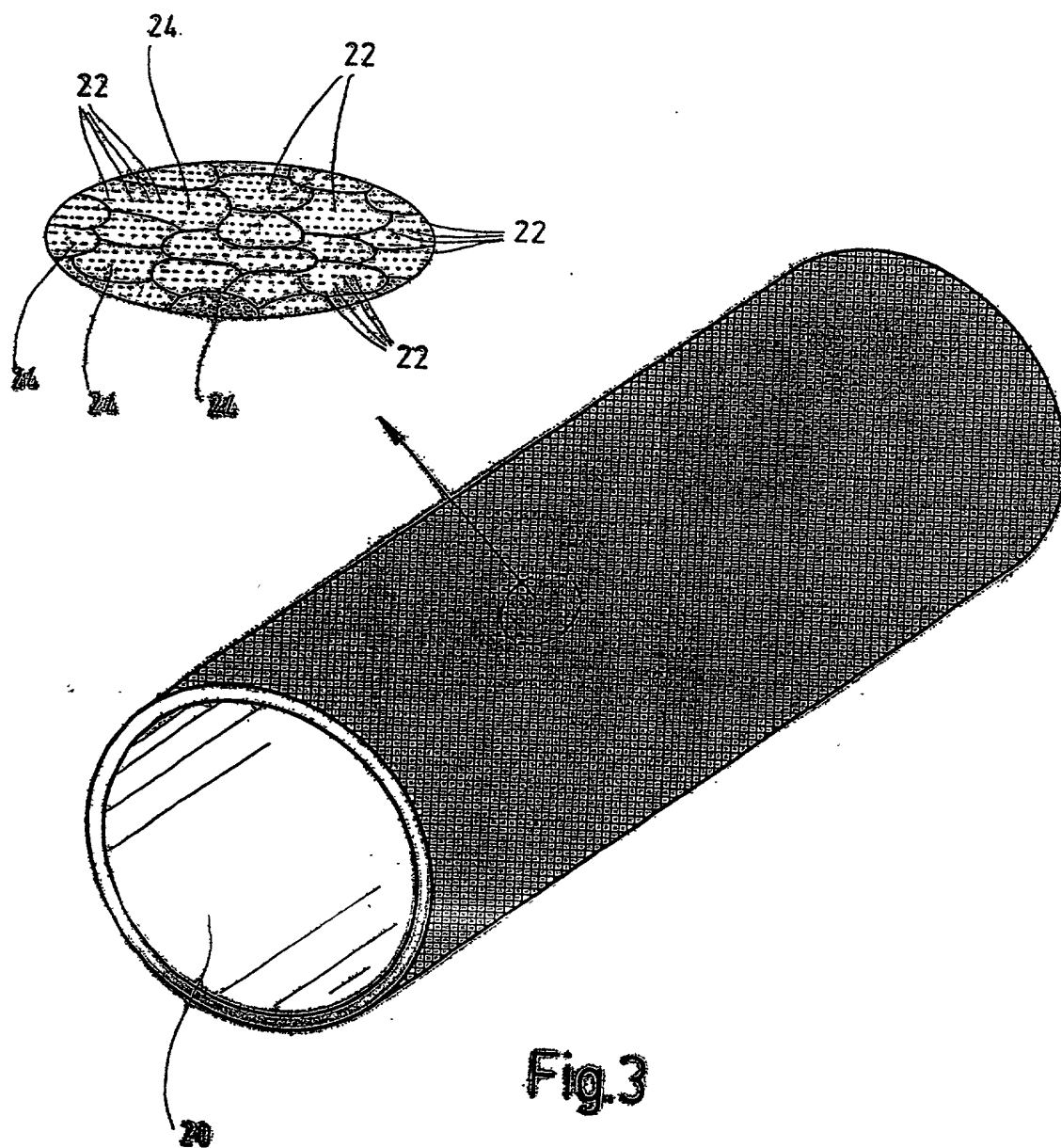


Fig.1





Declaration and Power of Attorney for Patent Application

Erklärung für Patentanmeldungen mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent für die Erfindung mit folgendem Titel beantragt wird:

deren Beschreibung hier beigelegt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

- ☐ wurde angemeldet am _____ unter der US-Anmeldenummer oder unter der Internationalen Anmeldenummer im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) _____ und am _____ abgeändert (falls zutreffend).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen Patentanmeldung, einschließlich der Ansprüche, die eventuell durch einen oben erwähnten Zusatzantrag abgeändert wurde, durchgesehen und verstanden habe.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

STRUCTURED SURFACE, PRODUCTION AND USE OF SAME

the specification of which is attached hereto unless the following box is checked:



was filed on August 17, 2000
as United States Application Number or PCT
International Application Number
PCT/EP00/08034 and was amended on
_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

German Language Declaration

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderurkunden, oder § 365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente bzw. Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

Prior Foreign Applications
(Frühere ausländische Anmeldungen)

199 43 299.6 Germany
(Number) (Country)
(Number) (Land)

(Number) (Country)
(Number) (Land)

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(e) aller US-Hilfsanmeldungen wie unten aufgezählt.

(Application No.) (Filing Date)
(Aktenzeichen) (Anmeldetag)

(Application No.) (Filing Date)
(Aktenzeichen) (Anmeldetag)

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

(Application No.) (Filing Date)
(Aktenzeichen) (Anmeldetag)

(Application No.) (Filing Date)
(Aktenzeichen) (Anmeldetag)

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Priority Not Claimed
Priorität nicht beansprucht

10/09/1999
(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)



(Day/Month/Year Filed)
(Tag/Monat/Jahr der Anmeldung)



I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Status) (patented, pending, abandoned)
(Status) (patentiert, schwebend, aufgegeben)

(Status) (patented, pending, abandoned)
(Status) (patentiert, schwebend, aufgegeben)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

German Language Declaration

VERTRETUNGSVOLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwältin) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent- und Markenamt: (Name(n) und Registrationsnummer(n) auflisten)

10

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

| | | | |
|-------------------|-----------------|-----------------------|-----------------|
| David S. Abrams | Reg. No. 22,576 | Lance G. Johnson | Reg. No. 32,531 |
| Robert H. Berdo | Reg. No. 19,415 | Dean H. Nakamura | Reg. No. 33,981 |
| Alfred N. Goodman | Reg. No. 26,458 | Stacey J. Longanecker | Reg. No. 33,952 |
| Mark S. Bicks | Reg. No. 28,770 | Joseph J. Buczynski | Reg. No. 35,084 |
| John E. Holmes | Reg. No. 29,392 | | |
| Garrett V. Davis | Reg. No. 32,023 | | |

Postanschrift:

Send Correspondence to:

Mark S. Bicks, Roylance, Abrams, Berdo & Goodman, L.L.P.
1300 19th Street N.W., Suite 600 Wash, D.C. 20036

Telefonische Auskünfte: (Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

Mark S. Bicks (202) 659-9076

| | |
|--|---|
| Vor- und Zuname des einzigen oder ersten Erfinders <div style="text-align: right;">1 - CC</div> | Full name of sole or first inventor Axel Schulte |
| Unterschrift des Erfinders Datum | Inventor's signature Date 26/02/02 |
| Wohnsitz | Residence Holzgerlingen, Germany DEX |
| Staatsangehörigkeit | Citizenship Germany |
| Postanschrift | Post Office Address Karlstr. 12 71088 Holzgerlingen, Germany |
| Vor- und Zuname des zweiten Miterfinders (falls zutreffend) 2 - CC | Full name of second joint inventor, if any Jan Tuma |
| Unterschrift des zweiten Erfinders Datum | Second Inventor's signature Date 26/02/02 |
| Wohnsitz | Residence Berlin, Germany DEX |
| Staatsangehörigkeit | Citizenship Germany |
| Postanschrift | Post Office Address Marchwitza Str. 48 12681 Berlin, Germany |

(Im Falle dritter und weiterer Miterfinder sind die entsprechenden Informationen und Unterschriften hinzuzufügen.)

(Supply similar information and signature for third and subsequent joint inventors.)